CLAIMS

What is claimed is:

1. A return path transmitter for use in conjunction with a local system that generates an analog RF data signal to be conveyed to a head end system, the return path transmitter comprising:

an RF signal receiver configured to receive and convert the analog RF data signal into digitized RF data samples, the RF signal receiver further configured to output a first data stream including the digitized RF data samples;

digital processing circuitry configured to digitally process the first data stream and create corresponding digitally processed data;

a summing circuit configured to sum the corresponding digitally processed data of the first data stream to create a combined digital data stream; and

an optical transmitter configured to convert the combined digital data stream into a first optical data signal for transmission over an optical fiber to the head end system.

2. The return path transmitter of claim 1, wherein the digital processing circuitry is further configured to

determine a signal strength of the RF data signal by reference to the first data stream; and

compute an analog amplification level for the RF data signal by reference to the signal strength.

3. The return path transmitter of claim 2, wherein the corresponding digitally processed data comprises the signal strength of the RF data signal.

4. The return path transmitter of claim 2, wherein the corresponding digitally processed data comprises the analog amplification level of the RF data signal.

5. The return path transmitter of claim 2, further comprising an amplifier, said amplifier configured to amplify the analog RF data signal by an amount that corresponds to the analog amplification level.

6. The return path transmitter of claim 1, further comprising means for receiving commands originating from the head end, said commands sent in response to the corresponding digitally processed data, wherein said commands when executed adjust an operation of the digital processing circuitry.

7. The return path transmitter of claim 1, wherein the digital processing circuitry is further configured to shape the first data stream in a frequency domain.

8. The return path transmitter of claim 7, wherein the digital processing circuitry is further configured to perform a predefined equalization of a gain of the RF data signal across a frequency range.

9. The return path transmitter of claim 7, wherein the digital processing circuitry is further configured to equalize a gain of the RF data signal across a frequency range by reference to and manipulation of the first data stream.

10. The return path transmitter of claim 7, wherein the digital processing circuitry is further configured to implement variable digital signal attenuation upon the first data stream.

11. The return path transmitter of claim 7, wherein the digital processing circuitry is further configured to filter noise from the first data stream.

12. The return path transmitter of claim 7, wherein the digital processing circuitry is further configured to:

separate the first data stream into two or more frequency bands;

separately filter noise from the two or more frequency bands; and

recombine the two or more frequency bands to reform the first data stream with reduced noise.

13. The return path transmitter of claim 7, wherein the corresponding digitally processed data relates to a shape of the first data stream in the frequency domain.

14. The return path transmitter of claim 1, wherein the digital processing circuitry is further configured to:

perform a spectrum analysis of the first data stream; and

detect an ingress problem by reference to the spectrum analysis.

15. The return path transmitter of claim 14, wherein the corresponding digitally processed data relates to the ingress problem.

16. The return path transmitter of claim 14, wherein the digital processing circuitry is further configured to compute a reduced analog amplification level for the RF data signal upon detecting the ingress problem.

17. A return path transmitter for use in conjunction with a local system that generates an analog RF data signal to be conveyed to a head end system, the return path transmitter comprising:

an RF signal receiver configured to receive and convert the analog RF data signal into digitized RF data samples, the RF signal receiver further configured to output a first data stream including the digitized RF data samples;

an optical transmitter configured to convert the first data stream into a first optical data signal for transmission over an optical fiber to the head end system; and

digital processing circuitry configured to determine a signal strength of the RF data signal by reference to the first data stream and compute an analog amplification level for the RF data signal by reference to the signal strength.

18. The return path transmitter of claim 17, wherein the digital processing circuitry creates corresponding digitally processed data comprising the signal strength and the analog amplification level of the RF data signal.

19. The return path transmitter of claim 17, further comprising an amplifier, said amplifier configured to amplify the analog RF data signal by an amount that corresponds to the analog amplification level.

20. A return path transmitter for use in conjunction with a local system that generates an analog RF data signal to be conveyed to a head end system, the return path transmitter comprising:

an RF signal receiver configured to receive and convert the analog RF data signal into digitized RF data samples, the RF signal receiver further configured to output a first data stream including the digitized RF data samples;

digital processing circuitry configured to shape the first data stream in a frequency domain; and

an optical transmitter configured to then convert the first data stream into a first optical data signal for transmission over an optical fiber to the head end system.

21. The return path transmitter of claim 20, wherein the digital processing circuitry is further configured to perform a predefined equalization of a gain of the RF data signal across a frequency range.

22. The return path transmitter of claim 20, wherein the digital processing circuitry is further configured to equalize a gain of the RF data signal across a frequency range by reference to and manipulation of the first data stream.

23. The return path transmitter of claim 20, wherein the digital processing circuitry is further configured to implement variable digital signal attenuation upon the first data stream.

24. The return path transmitter of claim 20, wherein the digital processing circuitry is further configured to filter noise from the first data stream.

25. The return path transmitter of claim 20, wherein the digital processing circuitry is further configured to:

separate the first data stream into two or more frequency bands;

separately filter noise from the two or more frequency bands; and

recombine the two or more frequency bands to reform the first data stream with reduced noise.

26. The return path transmitter of claim 20, wherein the corresponding digitally processed data relates to a shape of the first data stream in the frequency domain.

27. A return path transmitter for use in conjunction with a local system that generates an analog RF data signal to be conveyed to a head end system, the return path transmitter comprising:

an RF signal receiver configured to receive and convert the analog RF data signal into digitized RF data samples, the RF signal receiver further configured to output a first data stream including the digitized RF data samples;

an optical transmitter configured to convert the first data stream into a first optical data signal for transmission over an optical fiber to the head end system; and

digital processing circuitry configured to perform a spectrum analysis of the first data stream and detect an ingress problem by reference to said spectrum analysis.

28. The return path transmitter of claim 29, wherein the digital processing circuitry digitally processes the data within the first data stream to create a digital data stream comprising processed data relating to the ingress problem.

29. The return path transmitter of claim 29, wherein the digital processing circuitry is further configured to compute a reduced analog amplification level for the RF data signal upon detecting the ingress problem.